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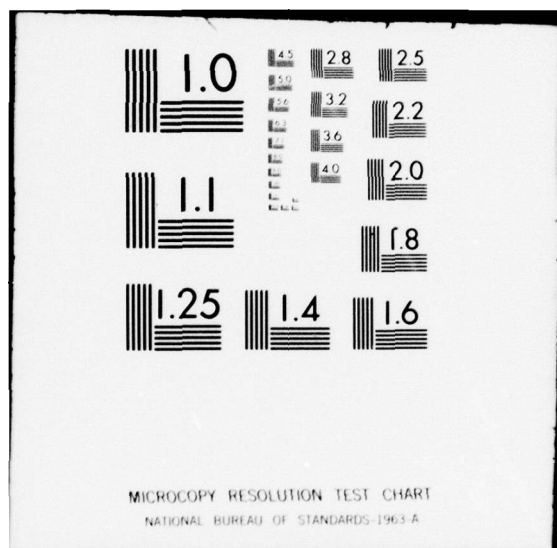
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ADVISORY GROUP FOR AEROSPACE RESEARCH & DEVELOPMENT

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TECHNICAL PROGRAM
1979

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THE MISSION OF AGARD

The mission of AGARD is to bring together the leading personalities of the NATO nations in the fields of science and technology relating to aerospace for the following purposes:

- Exchanging of scientific and technical information;
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Providing scientific and technical advice and assistance to the North Atlantic Military Committee in the field of aerospace research and development;
- Rendering scientific and technical assistance, as requested, to other NATO bodies and to member nations in connection with research and development problems in the aerospace field;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community.

The highest authority within AGARD is the National Delegates Board consisting of officially appointed senior representatives from each member nation. The mission of AGARD is carried out through the Panels which are composed of experts appointed by the National Delegates, the Consultant and Exchange Programme and the Aerospace Applications Studies Programme. The results of AGARD work are reported to the member nations and the NATO Authorities through the AGARD series of publications of which this is one.

Participation in AGARD activities is by invitation only and is normally limited to citizens of the NATO nations.

Published August 1978

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PREFACE

In March 1978, the AGARD National Delegates Board convened in Paris under the chairmanship of Mr Frank R.Thurston to review and approve the AGARD Technical Programme and Budget for 1979. Details of this proposed Technical Programme were presented to the National Delegates Board by the respective Panel Chairmen, the Chairman of the Aerospace Applications Studies Committee and AGARD Staff Officers, following which an overview of the 1979 Proposed Programme and Budget was presented.

↙ This report reflects the Programme that was approved by the AGARD National Delegates Board. Section I includes a chronological listing of the meetings tentatively scheduled to take place during 1979 and Section II gives a detailed description of the individual Panel Programmes, the Consultant and Exchange Programme, and the Military Committee Studies Programme. The total budget required to support the Proposed 1979 AGARD Technical Programme is presented in Section III. The Publication Summary in Section IV identifies by activity the AGARD publications scheduled for initiation and/or publication in 1979. ↗

Robert H. Korkegi

Robert H.Korkegi
Director

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I - CALENDAR OF PLANNED MEETINGS - 1979**Traduction des Titres des Réunions**

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**CALENDAR OF PLANNED MEETINGS
1979**

<i>Tentative Dates</i>	<i>Location</i>	<i>Panel</i>	<i>Type of Meeting/Subject</i>
22-26 January	BELGIUM (Brussels)	Aerospace Medical	Specialists' Meetings on – Maintenance of Air Operations while under Attack with Chemical Agents (Classified) – Recent Advances in Aeronautical and Space Medicine
5-6 March	TURKEY (Ankara)	Fluid Dynamics	Lecture Series No.98 Missile Aerodynamics
8-9 March	ITALY (Rome)	Fluid Dynamics	Lecture Series No.98 Missile Aerodynamics
12-16 March	BELGIUM (VKI, Brussels)	Fluid Dynamics	Lecture Series No.98 Missile Aerodynamics
21-23 March	FRANCE (Paris)	Headquarters	46th National Delegates Board Meeting 26th Panel Chairmen Meeting 9th National Coordinators Meeting 26th Steering Committee Meeting
1-6 April	UNITED STATES (Williamsburg, Va)	Structures & Materials	48th Panel Meeting/Specialists' Meeting – Damping Effects in Aerospace Structures – Low-cost Aircraft Flutter Clearance
2-6 April	NORWAY (Kolsås)	Propulsion & Energetics	53rd Panel Meeting/Symposium on Solid Rocket Motor Technology (Classified)
2-3 April	NORWAY (Oslo)	Structures & Materials	Lecture Series No.102 Bonded Joints and Preparation for Bonding
5-6 April	NETHERLANDS (The Hague)	Structures & Materials	Lecture Series No.102 Bonded Joints and Preparation for Bonding
9-13 April	TURKEY (Ankara)	Avionics	37th Panel Meeting/Symposium on Avionics Reliability, its Techniques and Related Disciplines
23-24 April	UNITED KINGDOM (London)	Propulsion & Energetics	Lecture Series No.103 Non-Destructive Inspection Methods for Propulsion Systems and Components
26-27 April	ITALY (Milan)	Propulsion & Energetics	Lecture Series No.103 Non-Destructive Inspection Methods for Propulsion Systems and Components
7-8 May	GERMANY (Bonn)	Avionics	Lecture Series No.100 Methodology for Control of Life Cycle Costs for Avionics Systems
10-11 May	GREECE (Athens)	Avionics	Lecture Series No.100 Methodology for Control of Life Cycle Costs for Avionics Systems
7-11 May	CANADA (Ottawa)	Guidance & Control	28th Panel Meeting/Symposium on Advances in Guidance and Control Systems using Digital Techniques (Classified)

<i>Tentative Dates</i>	<i>Location</i>	<i>Panel</i>	<i>Type of Meeting/Subject</i>
14–17 May	ITALY (Naples)	Fluid Dynamics	44th Panel Meeting/Symposium on Aerodynamic Characteristics of Controls
21–23 May	UNITED STATES (Washington)	Military Committee Studies	P2000 Review Board
24–25 May	UNITED STATES (Washington)	Aerospace Applications Studies Committee	Final Studies Review
21–25 May	UNITED KINGDOM (London)	Flight Mechanics	54th Panel Meeting/Symposium on Missile System Flight Mechanics (Classified)
28 May– 1 June	PORTUGAL (Lisbon)	Electromagnetic Wave Propagation	Symposium on Special Topics in H.F. Propagation
4–5 June	ITALY (Rome)	Guidance and Control	Lecture Series No.101 Guidance and Control for Tactical Guided Weapons with Emphasis on Simulation and Testing
7–8 June	TURKEY (Ankara)	Guidance and Control	Lecture Series No.101 Guidance and Control for Tactical Guided Weapons with Emphasis on Simulation and Testing
11–12 June	UNITED STATES (Eglin AFB, Fa)	Guidance and Control	Lecture Series No.101 Guidance and Control for Tactical Guided Weapons with Emphasis on Simulation and Testing
4–5 June	UNITED KINGDOM (London)	Electromagnetic Wave Propagation	Lecture Series No.99 Aerospace Propagation Media Modelling and Prediction Schemes for Modern Communications Navigation and Surveillance Systems
14–15 June	UNITED STATES (Boulder, Co)	Electromagnetic Wave Propagation	Lecture Series No.99 Aerospace Propagation Media Modelling and Prediction Schemes for Modern Communications Navigation and Surveillance Systems
3–6 September	GERMANY (Munich)	Flight Mechanics	55th Panel Meeting/Symposium on the Use of Computers as a Design Tool
10–14 September	NORWAY (Spåtind)	Electromagnetic Wave Propagation	26th Panel Meeting/Specialists' Meeting on Terrain Profiles and Contours in E.M. Propagation
19–21 September	ITALY (Florence)	Headquarters	15th Annual Meeting 47th National Delegates Board Meeting 27th Panel Chairmen Meeting
24–28 September	NETHERLANDS (The Hague)	Fluid Dynamics	45th Panel Meeting/Symposium on Turbulent Boundary-Layers – Experiments, Theory and Modelling
24–28 September	GERMANY (Cologne)	Propulsion & Energetics	54th Panel Meeting/Specialists' Meeting on a) Advanced Control Systems for Aircraft Power Plant (Classified) b) Combustor Modelling

<i>Tentative Dates</i>	<i>Location</i>	<i>Panel</i>	<i>Type of Meeting/Subject</i>
30 September– 5 October	GERMANY (Cologne)	Structures & Materials	49th Panel Meeting/Specialists' Meeting on Ceramics for Small Turbines (with participation of PEP)
4–5 October	FRANCE (Paris)	Aerospace Medical	Lecture Series No.105 Intensive Air Operations: Problems of Sleep, Wakefulness and Circadian Rhythms
8–9 October	CANADA (To be advised)	Aerospace Medical	Lecture Series No.105 Intensive Air Operations: Problems of Sleep, Wakefulness and Circadian Rhythms
8–12 October	DENMARK (Copenhagen)	Guidance & Control	29th Panel Meeting/Symposium on Tactical Air Traffic Management Systems and Technology (Classified)
15–19 October	FRANCE (Paris)	Avionics	38th Panel Meeting/Symposium on Modelling and Simulation of Avionics Systems and Command, Control and Communications Systems
16–18 October	GREECE (Athens)	Technical Information	32nd Panel Meeting/Specialists' Meeting on Review of Developments in R & D Information Transfer
22–26 October	PORTUGAL (Lisbon)	Aerospace Medical	36th Panel Meeting/Specialists' Meeting on – Aircrew Systems and Human Factors in Future High Performance Aircraft (with possible participation of FMP, GCP and TIP) – Low Altitude/High-Speed Flight – Aircrew Factors (with GCP and FMP)
29–30 October	NETHERLANDS (Delft)	Flight Mechanics	Lecture Series No.104 Parameter Identification
1–2 November	UNITED KINGDOM (London)	Flight Mechanics	Lecture Series No.104 Parameter Identification
13–14 November	GERMANY (Munich)	Military Committee Studies	P2000 Review Board Final Report Review
15–16 November	GERMANY (Munich)	Aerospace Applications Studies Committee	16th Meeting

Note: Meetings of the Military Committee Studies P2000 Working Groups are not included in this Calendar

TRADUCTION DES TITRES DES REUNIONS

Titles of Meetings

Titres des Réunions

Aerospace Medical Panel

- | | |
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| <ul style="list-style-type: none"> – Maintenance of Air Operations while under Attack with Chemical Agents – Recent Advances in Aeronautical and Space Medicine – Aircrew Systems and Human Factors in Future High-Performance Aircraft – Low Altitude/High Speed Flight – Aircrew Factors | <ul style="list-style-type: none"> – Maintien des Opérations Aériennes au cours d'Attaques par Agents Chimiques – Progrès Récents en Médecine Aéronautique et Spatiale – Systèmes à l'usage des Equipages, et Facteurs Humains, dans les Futurs Avions à Grandes Performances – Facteurs liés aux Equipages dans les Vols à Basse Altitude et Grande Vitesse |
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Avionics Panel

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| <ul style="list-style-type: none"> – Avionics Reliability, its Techniques and Related Disciplines – Modelling and Simulation of Avionics and Command, Control, and Communications Systems | <ul style="list-style-type: none"> – Fiabilité de l'Electronique Aérospatiale – Techniques et Disciplines Connexes – Modélisation et Simulation des Systèmes Electroniques Aérospatiaux et des Systèmes de Commande, de Contrôle et de Communications |
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Electromagnetic Wave Propagation Panel

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| <ul style="list-style-type: none"> – Special Topics in HF Propagation – Terrain Profiles and Contours in EM Propagation | <ul style="list-style-type: none"> – Problèmes Spécifiques de Propagation des Ondes HF – Profils et Contours de Terrain dans la Propagation des Ondes EM |
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Flight Mechanics Panel

- | | |
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| <ul style="list-style-type: none"> – Missile System Flight Mechanics – The Use of Computers as a Design Tool | <ul style="list-style-type: none"> – Mécanique du Vol des Systèmes de Missiles – L'Ordinateur en tant qu'Instrument de Conception |
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Fluid Dynamics Panel

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| <ul style="list-style-type: none"> – Aerodynamic Characteristics of Controls – Turbulent Boundary-Layers – Experiments, Theory and Modelling | <ul style="list-style-type: none"> – Caractéristiques Aérodynamiques des Commandes – Couches Limites Turbulentes – Expériences, Théorie et Modélisation |
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Guidance and Control Panel

- | | |
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| <ul style="list-style-type: none"> – Advances in Guidance and Control Systems using Digital Techniques – Tactical Air Traffic Management Systems and Technology | <ul style="list-style-type: none"> – Progrès en matière de Systèmes de Guidage et Contrôle Utilisant des Techniques Numériques – Systèmes et Technologie de Gestion du Trafic Aérien Tactique |
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Propulsion and Energetics Panel

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| <ul style="list-style-type: none"> – Solid Rocket Motor Technology – Advanced Control Systems for Aircraft Powerplants – Combustor Modelling | <ul style="list-style-type: none"> – Technologie des Moteurs Fusées à Propergol Solide – Systèmes Avancés de Commande pour Groupes Propulseurs d'Avions – Modélisation des Chambres de Combustion |
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Structures and Materials Panel

- | | |
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| <ul style="list-style-type: none"> – Damping Effects in Aerospace Structures – Low-Cost Aircraft Flutter Clearance – Ceramics for Small Turbines | <ul style="list-style-type: none"> – Les Effets de l'Amortissement dans les Structures Aérospatiales – Certification, du point de vue Flottement, des Avions de Faible Coût – Céramiques pour Turbomoteurs de Petites Dimensions. |
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Technical Information Panel

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| <ul style="list-style-type: none"> – Review of Developments in R&D Information Transfer | <ul style="list-style-type: none"> – Bilan des Réalisations en matière de Transfert d'Informations sur la Recherche et le Développement |
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Lecture Series

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| <ul style="list-style-type: none"> – Missile Aerodynamics – Aerospace Propagation Media Modelling and Prediction Schemes for Modern Communications, Navigation and Surveillance Systems – Methodology for Control of Life-Cycle Costs for Avionics Systems – Guidance and Control for Tactical Guided Weapons with Emphasis on Simulation and Testing – Bonded Joints and Preparation for Bonding – Non-Destructive Inspection Methods for Propulsion Systems and Components – Parameter Identification – Intensive Air Operations – Problems of Sleep, Wakefulness and Circadian Rhythms | <ul style="list-style-type: none"> – L'Aérodynamique des Missiles – Schémas de Modélisation et de Prédiction des Milieux de Propagation Aérospatiaux pour Systèmes Modernes de Communications, de Navigation et de Surveillance – Méthodologie du Contrôle des Coûts de Cycle de Vie des Systèmes Electroniques Aérospatiaux – Guidage et Contrôle des Armes Tactiques Guidées – en particulier, Simulation et Essais – Joints Collés et Préparation au Collage – Méthodes d'Examen non Destructif des Systèmes Propulsifs et de leurs Composants – Identification de Paramètres – Opérations Aériennes Intenses: Problèmes de Sommeil, de Vigilance et de Rythme Circadien |
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Aerospace Applications Studies Committee

- | | |
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| <ul style="list-style-type: none"> – AASC Meetings and Working Groups | <ul style="list-style-type: none"> – Réunions de l'AASC et Groupes de Travail |
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Project 2000

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| <ul style="list-style-type: none"> – Review Board Meetings | <ul style="list-style-type: none"> – Réunions du Comité Directeur |
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Headquarters

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| <ul style="list-style-type: none"> – AGARD Annual Meeting – National Delegates Board Meetings – Steering Committee Meeting – Panel Chairmen Meetings – National Coordinators Meeting | <ul style="list-style-type: none"> – Réunion Annuelle de l'AGARD – Réunions du Conseil des Délégués Nationaux – Réunion du Comité d'Orientation – Réunions des Présidents de Panels – Réunion des Coordonnateurs Nationaux |
|---|---|

II – PROGRAMME DESCRIPTIONS

PANELS

CONSULTANT & EXCHANGE PROGRAMME

- INDIVIDUAL CONSULTANTS
- LECTURE SERIES

MILITARY COMMITTEE STUDIES

HEADQUARTERS

AEROSPACE MEDICAL PANEL

Chairman: Médecin Général G.PERDRIEL, FAF, France
Deputy Chairman: Air Commodore J.N.C.COOKE, RAF, UK
Executive: Lt Colonel F.MONESI, IAF

PROGRAMME

In 1979, the Panel will cover four specialists' topics in the course of its Winter and Fall meetings.

At the Winter meeting, the first session (classified), entitled 'Maintenance of Air Operations while under Attack with Chemical Agents', will deal with the chemical warfare threat to air operations, the effects of chemical warfare agents, their detection and prophylaxis, the philosophy of protection against chemical warfare agents, the methods of providing this personal and collective protection and the physiological and operational penalties imposed by the chemical defence measures currently available and under development for aircrew. For the second session (unclassified), the topic 'Recent Advances in Aeronautical and Space Medicine' has been retained from the previous year's programme to present the significant medical advances regarding the problems of the selection of aircrew and astronauts, and supersonic and very long duration flight.

The Fall meeting will cover in its first session the subject of 'Aircrew Systems and Human Factors in Future High-Performance Aircraft', dealing with the operational characteristics of high-performance aircraft with emphasis on the physiological and psychological effects imposed on the aircrew. For the second session, the subject of 'Low-Altitude/High-Speed Flight - Aircrew Factors' has been chosen to review, modify, and improve current operating systems, define operational needs and resulting operational conditions, pathophysiological and performance limits, discuss methods to enhance performance, and improve survival.

The Working Group on 'Fidelity of Flight Simulation for Pilot Training' will continue to review the current status of ground-based flight simulator development, advise on the research requirements to solve simulation problems and summarize the state-of-the-art of flight simulation. Subject to approval, a new Working Group on 'Methods of Psychological and Psychiatric Examination in the Selection and Training of Aircrew' will highlight the psychological attitude research aspects of aircrew candidates for high-performance aircraft.

A Lecture Series will be held on the subject of 'Intensive Air Operations: Problems of Sleep, Wakefulness and Circadian Rhythms'.

The Panel will publish Conference Preprints for two and Conference Proceedings for all four topics of the specialists' meetings, as well as the final Report of the Working Group on 'Evaluation of Methods to Assess Workload', two AGARDographs and one Handbook.

MEETINGS

Specialists' Meeting	- Maintenance of Air Operations while under Attack with Chemical Agents (Classified)	22-26 January 1979 Belgium
	- Recent Advances in Aeronautical and Space Medicine	
36th Panel Business Meeting/Specialists' Meeting	- Aircrew Systems and Human Factors in Future High-Performance Aircraft	22-26 October 1979 Portugal
	- Low-Altitude/High-Speed Flight - Aircrew Factors	

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Maintenance of Air Operations while under Attack with Chemical Agents Conference Proceedings (including a Technical Evaluation Report) (Classified)	August 1979

<i>Subject</i>	<i>Projected Publication Date</i>
Recent Advances in Aeronautical and Space Medicine Conference Proceedings (including a Technical Evaluation Report)	August 1979
Aircrew Systems and Human Factors in Future High Performance Aircraft Conference Preprints	September 1979
Aircrew Systems and Human Factors in Future High Performance Aircraft Conference Proceedings (including a Technical Evaluation Report)	March 1980
Low-Altitude/High-Speed Flight – Aircrew Factors Conference Preprints	September 1979
Low-Altitude/High-Speed Flight – Aircrew Factors Conference Proceedings (including a Technical Evaluation Report)	March 1980
Human Factors in Aircraft Accidents AGARDograph	1979
Physiopathology of Spine Affections in Aerospace Medicine AGARDograph	1979
The Use of Hypnotics for Aircrew Handbook	1979

AVIONICS PANEL

Chairman: Ir H.A.T.TIMMERS, Netherlands
Deputy Chairman: Dr M.VOGEL, Germany
Executive: Unassigned

PROGRAMME

The 1979 Avionics Panel programme will consist of two Symposia and sponsorship of one AGARDograph.

The Spring Symposium is entitled 'Avionics Reliability, its Techniques and Related Disciplines'. It will seek management and engineering approaches to definition (specification) of meaningful reliability requirements and the methods of achieving them.

The Fall Symposium will examine 'Modelling and Simulation of Avionics and Command, Control, and Communications Systems'. With advances in computers and component technology, simulation is being used increasingly in avionics systems. This Symposium will cover the methodology and economics of simulation, simulation languages, computer techniques, and simulation applications, to provide an understanding of each aspect of simulation to optimize its use in the context desired.

An AGARDograph, to be entitled 'Digital Landmass Simulation (DLMS)' will be sponsored by the Panel. This document will describe implementing methodology, requirements, production processes, algorithms, and the methods available for validation of data base specifications.

MEETINGS

37th Panel Meeting/ Symposium	— Avionics Reliability, its Techniques and Related Disciplines	9-13 April Turkey
38th Panel Meeting/	— Modelling and Simulation of Avionics and Command Control and Communications Systems	15-19 October France

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Avionics Reliability, its Techniques and Related Disciplines Conference Preprints	February 1979
Avionics Reliability, its Techniques and Related Disciplines Conference Proceedings	September 1979
Modelling and Simulation of Avionics and Command, Control, and Communications Systems Conference Preprints	August 1979
Modelling and Simulation of Avionics and Command, Control, and Communications Systems Conference Proceedings	December 1979
Digital Landmass Simulation (DLMS) AGARDograph	December 1979

ELECTROMAGNETIC WAVE PROPAGATION PANEL

Chairman: Dr H.J. ALBRECHT, Germany
 Deputy Chairman: Dr J. AARONS, US
 Executive: Unassigned

PROGRAMME

The 1979 Electromagnetic Wave Propagation Panel programme will consist of one Symposium and one Specialists' Meeting.

The Spring Symposium will be on 'Special Topics in HF Propagation'. Its purpose will be to examine in depth the current knowledge of HF propagation in all its current and contemplated uses, and permit exchange of information concerning requirements, capabilities and future research effort.

A Specialists' Meeting, entitled 'Terrain Profiles and Contours in EM Propagation' will be held in the Fall. It will address the propagation problems which are associated with profiles and contours of the terrain. Theoretical aspects of digital terrain mapping, criteria of terrain shielding, terrain effects on antenna characteristics, and subsurface contours and profiles will be examined.

MEETINGS

Symposium	— Special Topics in HF Propagation	24 May–1 June 1979 Portugal
26th Panel Meeting/ Specialists' Meeting	— Terrain Profiles and Contours in EM Propagation	10–14 September 1979 Norway

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Special Topics in HF Propagation Conference Preprints	March 1979
Special Topics in HF Propagation Conference Proceedings	September 1979
Terrain Profiles and Contours in EM Propagation Conference Preprints	June 1979
Terrain Profiles and Contours in EM Propagation Conference Proceedings	December 1979

FLIGHT MECHANICS PANEL

Chairman: Dipl. Ing. H. MAX, Germany
Deputy Chairman: M. l'Ingenieur J.F. RENAUDIE, France
Executive: Sqn Ldr D.A. STANGROOM, RAF

PROGRAMME

In 1979 the Flight Mechanics Panel will hold two Symposia and sponsor a Lecture Series and a short course.

The first Symposium will be on the subject of 'Missile System Flight Mechanics'.

Missiles, like manned aircraft, are required to achieve certain goals in performance and controllability, they also have to obey the same laws of dynamics and aerodynamics and, while speeds, rates, and dynamic characteristics may be very different, the flight mechanics of missiles and of manned aircraft are fundamentally the same. For many reasons, however, the application of the laws of flight mechanics to missile and manned aircraft design have been applied differently. There is, therefore, much to be gained from a cross-fertilisation of the expertise in the two technologies.

It was considered appropriate that the initial FMP activity in this field should be a restricted one, dealing with the flight mechanics aspects of air-launched missiles that rely, to some extent, on aerodynamic means of achieving the required control and performance capabilities. Emphasis will be given to short range tactical missiles and guided weapons of the air-to-air and air-surface types, with consideration of longer range air-surface missiles and of systems with a look-down shoot-down capability. The impact of requirements for launch compatibility with fixed and rotary wing aircraft will be examined. The Symposium will consist of five sessions, including a round-table discussion, and a workshop that will present the very latest results and findings. The first session will cover the complete missile, from an overview of evolution and design development, through current requirements, to a discussion of the implications on missile flight mechanics of recent developments in guidance and control systems technologies, that have been made possible by advances in solid state avionics and digital processors. The second session will deal with design/development, including such things as preliminary design techniques and methods for meeting manoeuvre requirements. Session three will cover simulation and flight testing including performance, manoeuvre and hit simulation, test instrumentation and techniques and range requirements. Operational aspects will be covered in session four, with emphasis on experience and its impact on future requirements; also the problems of the man in the control loop will be discussed. Finally, a round-table discussion will explore the benefits to be obtained from an interchange of manned aircraft and missile technologies and will assess the possibilities for improved cost effectiveness.

The second Symposium will concern developments in the 'Use of Computers as a Design Tool'.

The complexity of aircraft design procedures, the large financial investment and technical efforts involved, and the increasing importance of the basic initial options in any new aircraft programme require heavy reliance on computers to generate valid and competitive solutions. The rapid and great advances in computer hardware and software, and the more and more specialized nature of computation, have resulted in the generation of a new breed of computer system engineers. There has been a tendency for two diverging groups to emerge: one group highly specialized in computing and knowing little about design, the other very familiar with design, but with limited knowledge in computing. This undesirable situation could be avoided by improving the communication between the designer and the computer specialist. There is also a need to overcome the problems of communication between the designer and computer itself and to handle the difficulties arising from the need for perpetual updating of computer programmes.

With these points in mind it is intended that this Symposium will cover the topic under four session headings. The first of these will investigate the present and future potential of small and large computer systems including such items as data collection and optimization techniques and computerised drawing. The second session will be on the use of computers in aircraft specification; covering such areas as operational research and mission definition for military aircraft and market survey and fuel economy for commercial aircraft. The third session, on the computer as a preliminary design tool, will examine the impact of recent advances. These have not only led to the possibility of making more detailed studies, but also to a tendency for development of either a modular design process, with numerous iterations between various specialised teams, or an integrated process based on a large interdisciplinary programme; the advantages and disadvantages of these will be discussed. The final session will look at the use of computers in detailed design and development. The areas covered will be aerodynamic programmes, including such items as wing design and airframe/propulsion integration; structural analysis, including aeroelasticity/handling qualities interaction and flutter; and more general items such as flight testing and system integration and development. Throughout all the sessions emphasis will be placed on the financial implications of using the systems described and, in particular, their limitations.

The Panel will be involved in four Working Groups. Two of these, on 'Manoeuvre Boundaries in the Design Phase of Combat Aircraft' and 'Dynamic Characteristics of Flight Simulator Motion Systems' will be in their closing stages

and a third, on 'Flight Test Instrumentation' will be finalising some of the last volumes in the AG160 series, and continuing to update the Manual on Flight Test Techniques. The co-operative work with the Aerospace Medical Panel on 'Fidelity of Flight Simulation for Pilot Training' is expected to reach a peak.

The Panel will sponsor a Lecture Series on 'Parameter Identification'; this will be aimed primarily at providing flight test engineers with the basic theory of parameter identification, its possible applications to the various areas of flight test work, and ideas on future developments.

It is also proposed to hold a further short course on 'Flight Test Instrumentation' similar to that held previously at DFVLR and Cranfield. This course will again be aimed at providing flight test instrumentation engineers with both the theory and practical application of instrumentation techniques and will include flight time in a laboratory aircraft.

MEETINGS

54th Panel Meeting/ Symposium	— Missile System Flight Mechanics	21–25 May 1979 United Kingdom
55th Panel Meeting/ Symposium	— The Use of Computers as a Design Tool	3–7 September 1979 FRG

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Stability and Control Conference Proceedings	February 1979
Stability and Control Technical Evaluation Report	January 1979
Missile System Flight Mechanics Conference Proceedings	October 1979
Missile System Flight Mechanics Technical Evaluation Report	September 1979
Flight Test Instrumentation and Test Technique Volumes AGARDographs	1979
Flight Simulator Motion Quality Advisory Report	1979
Estimation of Manoeuvre Boundaries in the Design Phase of Combat Aircraft Advisory Report	1979

FLUID DYNAMICS PANEL

Chairman: Mr J.L.JONES, US
Deputy Chairman: Dr K.J.ORLIK-RÜCKEMANN, Canada
Executive: Mr R.H.ROLLINS II, US

PROGRAMME

The Fluid Dynamics Panel 1979 Programme consists of two Symposia, sponsorship of a Lecture Series, Special Course, and Working Group, and publication of several AGARDographs and Reports.

The Spring 1979 Symposium on 'Aerodynamic Characteristics of Controls' will focus on improving our understanding of the factors that determine aerodynamic effectiveness of controls. The flight envelopes of aircraft are being continuously expanded and increasing use is being made of electronic technology to assist the pilot and indeed take over this traditional role. Much effort is now being applied to the development of active control technology involving the use of controls in closed-loop stabilising systems with consequent design, handling and performance improvements, and thought is being given to controls suitable for direct lift (including side-force) control.

The increasing demands made of controls call for more accurate methods of predicting control characteristics, including interference effects, and exploration of novel methods of control. These include not only the traditional aerodynamic control surfaces, but also spoilers, tailerons, wingerons, flaperons, elevons, canards, blown controls, leading edge controls, vectored thrust controls, etc.

The Symposium will aim to reveal the more important problems with which we are faced and to determine the lines along which research should prove most fruitful. Experimental data covering all flight conditions including transonic speeds and high angles of attack will be included. Also invited will be studies of dynamic characteristics in manoeuvres, quick acting controls, effects of interference gaps and buffeting, experiences gained in active control in direct lift systems, prediction methods, and related problems of controls for missiles.

In the Fall, a Symposium on 'Turbulent Boundary-Layers - Experiments, Theory and Modelling' will be held. Turbulence is the principal unknown in any rational design of aircraft. In spite of very significant advances in computing techniques, the modelling of turbulent shear flows still rests on quite insecure foundations. A better understanding of turbulent boundary layers is crucial for further advances in aircraft performance prediction. The flux of mass, momentum, and energy in laminar flow are proportional to the local gradients of concentration, velocity, and temperature. There exists no similar simple rule relating flux terms in turbulent flow to the corresponding gradients. In recent years, theory and modelling on one side and experiments on the other have followed diverging directions in turbulence research. Recent experiments have demonstrated the persistence of coherent structures in turbulent shear flows and consequently have cast doubt on the usual local transport relations and even on the usefulness of Reynolds averaging, used in practically all modelling approaches.

It is the purpose of the symposium to take stock of the present situation in turbulence research and to attempt, by bringing together experimentalists and theoreticians, to map out new directions in modelling and experimentation. In order to concentrate on one of the most important applied problems, the symposium deals specifically with turbulent boundary layers, in both incompressible and compressible fluid flow. Invited papers will include experimental studies aimed at a clarification of physical phenomena in turbulent boundary layers, such as the persistence and interaction of turbulent spots, the existence and effects of longitudinal vortices near a solid boundary, and the mechanism of the bursting phenomenon. Also to be invited are reports of analytical and numerical work which either attempts to incorporate the recent experimental findings into a turbulence model or addresses the proposition that the observed coherent structure need not be considered in models aimed at a prediction of averaged boundary-layer properties. Finally, although laminar-turbulent transition is outside the scope of the symposium, results on possible persistent after-effects of transition on the turbulent boundary layer will be solicited.

The Panel will also sponsor a Lecture Series on 'Missile Aerodynamics' which will treat all the primary aspects regarding aerodynamics of tactical missiles. The intent of the Lecture Series is to be complementary to the proposed 1979 FMP Symposium on 'Missile Flight Mechanics'.

Additionally, the Panel will support a Special Course on 'Acoustic Wave Propagation' which will consider homogeneous and moving media of both unlimited and finite extent. The phenomena of reflection, refraction, scattering and diffraction, which have significant applications in aeronautical acoustics, will be treated in detail.

The FDP Sub-Committee on Windtunnel Testing Techniques will continue to monitor and support research activities involving transonic test section wall design and flow quality, aerodynamic noise, model systems for high Reynolds number facilities, and boundary-layer transition.

The new Working Group on 'Fluid Dynamic Aspects of Internal Ballistics' will focus on enhancing our understanding of an ability to predict complicated internal ballistic flows to minimize or eliminate numerous problems which restrict operability, increase costs, and produce hazardous situations.

MEETINGS

44th Panel Meeting/ Symposium	— Aerodynamic Characteristics of Controls	14–17 May 1979 Naples, Italy
45th Panel Meeting/ Symposium	— Turbulent Boundary-Layers – Experiments, Theory and Modelling	24–27 September 1979 The Hague, Netherlands

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
High Angle-of-Attack Aerodynamics Conference Proceedings	February 1979
High Angle-of-Attack Aerodynamics Technical Evaluation Advisory Report	February 1979
Aerodynamic Characteristics of Controls Conference Preprints	April 1979
Acoustic Wave Propagation Special Course Proceedings	May 1979
Aerodynamic Characteristics of Controls Conference Proceedings	September 1979
Turbulent Boundary-Layers – Experiments, Theory and Modelling Conference Preprints	September 1979
A Commentary on Available Compressible Turbulent Boundary-Layer Data AGARDograph	October 1979
Aerodynamic Characteristics of Controls Technical Evaluation Advisory Report	October 1979
Turbulent Boundary-Layers – Experiments, Theory and Modelling Conference Proceedings	December 1979
Turbulent Boundary-Layers – Experiments, Theory and Modelling Technical Evaluation Advisory Report	1980
Airfoils and Wings for Transonic Flight AGARDograph	1980
Models of the Lower Atmosphere AGARDograph	1980
Aircraft Drag Estimation AGARDograph	1980
AGARD Windtunnel Handbook Report	1980
Report of Working Group 05 – Fluid Dynamic Aspects of Internal Ballistics	1981

GUIDANCE AND CONTROL PANEL

Chairman: Mr P.KANT, Netherlands
Deputy Chairman: Mr G.C.HOWELL, UK
Executive: Colonel J.C. de CHASSEY, FAF

PROGRAMME

The 1979 activities of the Guidance and Control Panel consist of two Symposia and two AGARDographs. The Panel will also sponsor a Lecture Series.

The Spring Symposium, 'Advances in Guidance and Control Systems using Digital Techniques' (NATO-CONFIDENTIAL), will deal with applications of microprocessors to guidance and control, application of advanced analytic and design methods, software design, simulation and validation techniques, multi-sensor landing for increased performance and fault tolerance, redundancy management and operational and development performance with these advances.

The Fall Symposium will be devoted to 'Tactical Air Traffic Management Systems and Technology' and will focus on applications to tactical situations in the NATO environment, thus requiring classified sessions (NATO-SECRET). Based on the presentation of possible operation scenarios, the conference will discuss the adequacy of those air traffic control concepts in current use and critically review recent advances including: digital data links, computer architecture, global positioning, automatic distribution of information, displays, processors and integrated systems. The transition to a future civil/military system using the most advanced techniques will be considered, and evolutionary implementation schemes will be proposed.

The Panel will publish an AGARDograph on 'Guidance and Control Systems Simulation and Validation Techniques'. A second AGARDograph will be devoted to 'Onboard Guidance and Control Software Design and Development'.

The Panel will also support a Lecture Series on 'Guidance and Control for Tactical Guided Weapons with Emphasis on Simulation and Testing'.

MEETINGS

28th Panel Meeting/ Symposium (Classified)	— Advances in Guidance and Control Systems using Digital Techniques	7-11 May 1979 Canada
29th Panel Meeting/ Symposium (Classified)	Tactical Air Traffic Management Systems and Technology	8-12 October 1979 Denmark

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
The Guidance and Control of Helicopters and V/STOL Aircraft at Night and in Poor Visibility Conference Proceedings	February 1979
The Guidance and Control of Helicopters and V/STOL Aircraft at Night and in Poor Visibility Technical Evaluation Report	February 1979
Advances in Guidance and Control Systems using Digital Techniques Conference Proceedings	October 1979

<i>Subject</i>	<i>Projected Publication Date</i>
Advances in Guidance and Control Systems using Digital Techniques Technical Evaluation Report	October 1979
Onboard Guidance and Control Software Design and Development AGARDograph	November 1979
Guidance and Control Systems Simulation and Validation Techniques AGARDograph	April 1980

PROPULSION AND ENERGETICS PANEL

Chairman: Prof. Dr Ing. G.WINTERFELD, Germany
Deputy Chairman: Dr J.DUNHAM, UK
Executive: Dipl. Ing. J.H.KRENGEL

PROGRAMME

In 1979 the activities of the Propulsion and Energetics Panel will range from combustion fundamentals and technology as encountered in aero-engine combustors and solid propellant rocket motors to advanced control systems for aircraft powerplant. The activities will include various aspects of the flow in turbomachines and applications of ceramics in small turbine engines. Moreover, great emphasis will be placed on the research in progress and additionally demanded by the forthcoming use of alternative jet engine fuels.

In the year 1979, the Panel will sponsor three technical meetings: a Symposium in the Spring, and two Specialists' Meetings in the Fall. An important contribution will also be made to another specialists' meeting sponsored by the Structures and Materials Panel.

The Symposium, on 'Solid Rocket Motor Technology', is aimed at furnishing a comprehensive survey of the technology available for solid propellant rocket motors and its further development capabilities. Starting from the military requirements both research and technology problems will be discussed. Separate sessions will be devoted to ignition and extinction problems, and internal ballistics, to the combustion of metals and particles (considering both the basic problem of single particles as well as the combustion of particle clouds), and to smokeless propellants. Particular attention will be given to combustion instability, its analysis, and relation with dynamic properties of propellants and comparison between theoretical predictions and observations. High frequency instabilities, velocity coupling, suppression devices and the dynamic performance of nozzles are important features and will be discussed. The Symposium will be concluded by sessions concerned with heat transfer in nozzles and nozzle liners including suitable insulation materials as well as with testing and instrumentation which both will be covered in the aspect of laboratory work, development, and flight.

The first Specialists' Meeting will be entitled 'Advanced Control Systems for Aircraft Powerplants'. During the past years considerable progress has been achieved in digital electronic techniques and their use in control systems. This Specialists' Meeting will review the state-of-the-art and discuss the optimum control strategies for aero engines, the possibilities of integrated engine intake and flight control systems with respect to future military aircraft. The implementation of control by advanced hydro-mechanical, fluidic, or electronic systems will be included and redundancy strategies and system integrity analyzed and compared with recent experimental experience of advanced engine controls.

The second Specialists' Meeting will deal with 'Combustor Modelling'. This Meeting addresses research workers of aero-engine manufacturers and other related industries as well as of institutes. Its objectives are to help manufacturers in selecting and substantiating adequate theoretical models and, on the other hand, to provide university researchers with knowledge about realistic combustors and on the experimental conditions under which theoretical models should be validated. Discussions will be focussed on purely theoretical work and its comparison with experimental data. One part of the meeting will deal with elementary phenomena like fuel injection and vaporisation, overall models of chemical kinetics, aerodynamics of primary and dilution zones, modelling of gas and metal radiation, and will include non-stationary phenomena, e.g., ignition and instabilities. In a second part, synthesis of elements and application of models to performance, operation and optimization of main combustors in turbine engines, after-burners, and industrial combustors will be discussed as well as the pollution prediction capabilities, e.g., the generation of carbon monoxide, nitrogen oxides, unburned hydrocarbons and smoke.

For the Specialists' Meeting on 'Ceramics for Small Turbine Engine Application', which will be sponsored by the Structures and Materials Panel, PEP will take the responsibility for the session on 'Systems Design Analysis' and share sponsorship with SMP for the session 'Ceramic Component Design and Test Experience', as well as for the round-table discussion.

As usual, the Panel will sponsor a Lecture Series. In continuing the activities on powerplant reliability, the subject will be 'Non-Destructive Inspection Methods for Propulsion Systems and Components'. This Lecture Series is aimed at meeting the needs of NATO Air Forces. Advanced inspection methods will be treated in depth and their impact on maintenance effectiveness and life-cycle cost reduction will be outlined.

Working Group activities of PEP will be even more widespread in 1979. The two Working Groups on 'Turbulent Transport Phenomena', and 'Aircraft Fire Safety' will have finished their work in 1978, and publication of their reports is expected in early 1979.

The Working Group on 'Through-Flow Calculations in Turbo-machines' will continue its activities which had started in 1978. After completing the review of existing experimental correlations on design and particularly on off-design blade performance, the Working Group will well advance to apply these correlations comparatively to typical test cases.

The Panel will initiate two new Working Groups in 1979. Working Group 13 on 'Alternative Jet Engine Fuels' will assess the achievements and shortcomings of current research and development programs within NATO nations. It will evaluate the results and emphasize the impacts expected on the operation of aero engines and aircraft fuel systems.

Working Group 14 on 'Suitable Averaging Techniques in Non-Uniform Internal Flows' will deal with a more basic but equally important problem frequently encountered when analyzing the performance of gas turbine powerplants. The Working Group will identify those averaging techniques which are in principle correct when seeking to calculate heat, power, thrust, and efficiency for the one-dimensional approach to a gas turbine engine. It furthermore will try to quantify the levels of uncertainty of the different averaging methods and their effects on the performance analysis.

MEETINGS

53rd Panel Meeting/ Symposium (Classified)	— Solid Rocket Motor Technology	2-6 April 1979 Norway
54th Panel Meeting/ Specialists' Meetings	— Advanced Control Systems for Aircraft Powerplants — Combustor Modelling	24-28 September 1979 Germany

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Solid Rocket Motor Technology Conference Preprints	March 1979
Solid Rocket Motor Technology Technical Evaluation Report	July 1979
Solid Rocket Motor Technology Conference Proceedings (Classified)	September 1979
Advanced Control Systems for Aircraft Powerplants Conference Preprints	August 1979
Advanced Control Systems for Aircraft Powerplants Technical Evaluation Report	December 1979
Advanced Control Systems for Aircraft Powerplants Conference Proceedings	December 1979
Combustor Modelling Conference Preprints	August 1979
Combustor Modelling Technical Evaluation Report	December 1979
Combustor Modelling Conference Proceedings	December 1979
Aircraft Fire Safety Parts II and III of Advisory Report of Working Group	February 1979

STRUCTURES AND MATERIALS PANEL

Chairman: Mr N.F.HARPUR, UK
Deputy Chairman: Mr J.B. de JONGE, Netherlands
Executive: Mr J.M.N.WILLIS

PROGRAMME

It has been necessary to make some changes to the 1979 programme and the Spring Panel Meeting will now include two Specialists' Meetings, as follows. The main Meeting will be on 'Damping Effects in Aerospace Structures' which will deal with the type of aerospace problem where damping is of crucial importance and for which no systematic treatment has yet been attempted from a practical point of view. This Meeting will be the first step in the preparation of an AGARDograph, to be published in 1980, which will review available data. The second will be a one-day Meeting on 'Low-Cost Aircraft Flutter Clearance' which will review low-cost flutter prediction procedures, especially with regard to light airplanes and gliders.

During the Fall Panel Meeting, a Specialists' Meeting will be held on 'Ceramics for Small Turbines'. It is becoming increasingly apparent that uncooled ceramic components may be one of the best ways of meeting anticipated system requirements for engines with higher thrust to weight and thrust per unit volume ratios for missile and RPV applications. Many of the programmes currently under way are addressing and solving the design problems outlined in a previous AGARDograph and a number of important lessons has already been learned about the selection and processing of ceramic materials for these applications. Sharing this information now and updating earlier publications in this area should greatly accelerate the development of ceramic engine technology. The Propulsion and Energetics Panel is participating in the preparation of the programme for this Meeting.

The cooperative testing programme on 'The Effect of Hole Quality on Fatigue Life in Mechanically-Fastened Joints' will be completed during 1979. Results will be published as an AGARD Report. Another cooperative programme, on 'Corrosion Fatigue', will be under way throughout the year involving research laboratories in both Europe and the USA. Results will be reviewed at a Specialists' Meeting to be held in Spring 1981.

The Fracture Mechanics Design Methodology Working Group will complete their work and an AGARDograph on 'Practical Applications of Fracture Mechanics' will be published in the Fall. The Working Group on Standard Aeroelastic Configurations will complete the first three phases of their work with the publication of the selected standard definitions. A new Working Group on 'Helicopter Fatigue' will, if approved by the NDB in Fall 1978, be engaged in the preparation of a Handbook.

The Sub-Committee on Corrosion will complete their survey of corrosion information sources and needs with publication of a Report. Work will continue throughout the year on the preparation of an AGARDograph 'Handbook on Corrosion'. The Sub-Committee on Factors of Safety will complete their compilation of data on factors of safety currently applied and the philosophies behind their selection. The Sub-Committee on R&D Cooperation is expected to continue their work in facilitating the establishment of cooperative programmes from which the small nations may benefit.

The Panel is also sponsoring a Lecture Series on 'Bonded Joints and Preparation for Bonding'.

MEETINGS

48th Panel Meeting/	– Damping Effects in Aerospace Structures	1–6 April 1979
Specialists' Meeting/	– Low-Cost Aircraft Flutter Clearance	USA
Working Group Sessions		
49th Panel Meeting/	– Ceramics for Small Turbines	30 September–
Specialists' Meeting/		5 October 1979
Working Group Sessions		Germany

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Damping Effects in Aerospace Structures Conference Proceedings	July 1979
Low Cost Aircraft Flutter Clearance Conference Proceedings	July 1979
Ceramics for Small Turbines Conference Proceedings	December 1979
Practical Applications of Fracture Mechanics AGARDograph	December 1979
Battle Damage Repair Advisory Report	July 1979
The Effect of Hole Quality on Fatigue Life in Mechanically-Fastened Joints Report	December 1979
Factors of Safety – Compilation of Data Report	November 1979
Corrosion Information Survey Report	February 1979
Standard Aeroelastic Configurations Report	July 1979

TECHNICAL INFORMATION PANEL

Chairman (Acting): Ir A.S.T.TAN, Netherlands
Deputy Chairman: To be appointed
Executive: Mr E.T.SHARP

PROGRAMME

The Panel will hold a Specialists' Meeting entitled 'Review of Developments in R&D Information Transfer'. One of the main elements of the work of the Technical Information Panel is to assist NATO's aerospace research and development activities by improving the effectiveness of scientific and technical information systems throughout the member nations. The choice of theme for the 1979 Specialists' Meeting stems from consideration of this aspect of TIP's work. Development goes on constantly, and the meeting will review recent changes not only in the channels and media of information transfer but also in the nature of the information itself. Arising out of this, it is hoped that firm plans can be laid for a broadening and extension of existing information transfer facilities in the fields of aerospace and defence R&D in particular areas of the NATO community.

Work will proceed in 1979 on further sections of the 'Manual of Documentation Practices Applicable to Defence/Aerospace Scientific and Technical Information'. This very comprehensive work is being published incrementally over a four-year period and is scheduled for completion in 1981.

The final stages of preparation and checking of the new AGARD Multilingual Aeronautical Dictionary are scheduled to be undertaken and completed during the year and the complex compilation programme by NASA computer, and subsequent printing, are planned to be finished by the end of the year. The Panel anticipates that, despite the various frustrating setbacks which have been encountered, the long and painstaking effort on the part of the numerous contributors within the NATO nations will ultimately be rewarded by a worthwhile and valuable reference document.

MEETINGS

32nd Panel Meeting/ — Review of Developments in R&D Information Transfer
 Specialists' Meeting

16-18 October 1979
 Greece

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Review of Developments in R&D Information Transfer Conference Preprints	September 1979
Review of Developments in R&D Information Transfer Conference Proceedings	December 1979
A Manual of Documentation Practices Applicable to Defence/Aerospace Scientific and Technical Information Sections 7, 8 and 9	December 1979
Semi-Automatic Indexing AGARDograph	October 1979
Multilingual Aeronautical Dictionary	December 1979
1977-1979 Supplement to the AGARD Index	1980

CONSULTANT AND EXCHANGE PROGRAMME

Director, Plans and Programmes: Mr R.A.WILLAUME
Deputy Director, Plans and Programmes: Mr B.HELLOT

INDIVIDUAL CONSULTANTS

The Consultant and Exchange Programme makes available to the NATO Member Nations scientific and technical expertise in the aerospace field. Individual Consultants are specifically requested by the National Delegates of the Nations concerned. Individual consultants are also made available to support varied AGARD activities; Panels or Panel Members request individual consultants' expertise, visits and lectures by individuals or by teams of experts for carrying out part of their programmes. Panels, Working Groups and the AASC also make use of individual consultants to support specific projects. Consultants will also support two special courses planned by the Flight Mechanics Panel and the Fluid Dynamics Panel.

LECTURE SERIES

Based upon recommendations made by Panels, the Consultant and Exchange Programme proposes to implement eight Lecture Series during the year 1979. Every Panel but one will have a Lecture Series.

The number of presentations in each Lecture Series has been limited in order to maintain the same level of effort.

Taking into account the requests of the various nations, 18 locations have been tentatively selected for the presentation of these 8 Lecture Series.

A description of the eight Lecture Series proposed follows:

Lecture Series No.98	MISSILE AERODYNAMICS	March 1979
(FDP)		Belgium/Turkey/Italy

The course will cover all the chief aspects of the aerodynamics of tactical missiles. It will be introduced with an extended overview of the more classical topics, such as flow over wings and bodies, wing-body and wing-tail interference and aerodynamics of complete configurations. This course will be a follow-on from the previous VKI Lecture Series organized in 1976, in that the following more specialized topics related to improved design of missiles will be treated in more detail:

- control of missiles, high angle-of-attack aerodynamics, base flow, and
- weapon-aircraft interactions (stores and stores separation).

At the VKI Location, VKI will sponsor an additional 2½ days of lectures to cover the areas of kinetic heating, internal flows in airbreathing engines and external aerodynamic aspects of intakes. The published Proceedings will contain an extensive documentation of the subject (additional to all the oral presentations) and as such will be a valuable reference document.

Lecture Series Director: Dr B.E.Richards, Von Kármán Institute, Brussels, Belgium

Lecture Series No.99	AEROSPACE PROPAGATION MEDIA MODELLING AND	June 1979
(EPP)	PREDICTION SCHEMES FOR MODERN COMMUNICATIONS, US/UK	
	NAVIGATION, AND SURVEILLANCE SYSTEMS	

The proposed lecture series will review modelling and prediction topics which have been presented at a number of meetings of the AGARD Electromagnetic Wave Propagation Panel in the last few years. Modelling and prediction schemes of the aerospace radio and optical propagation environment based on media characterization have become essential to meet requirements of operational accuracies in communication, navigation, and surveillance in military and civilian systems.

The lectures will include the following topics:

1. General Modelling and Prediction Schemes.
2. Aerospace (Atmosphere Ionosphere, and the Space Environment).
3. Short- and Long-Term Prediction Techniques and Agreement with Observation Data.
4. Adaptability of Prediction Techniques to Radio and Optical Communication, Navigation and Surveillance Systems Operating in the Aerospace Environment.
5. Effects of Geophysical Disturbances on the State of the Media and their Predictability.

Lecture Series Director: Dr H.Soicher, US Army Electronics Command, Fort Monmouth, New Jersey, USA

Lecture Series No.100
(AVP)

**METHODOLOGY FOR CONTROL OF LIFE-CYCLE
COSTS FOR AVIONICS SYSTEMS**

May 1979
Germany/Greece

The continually increasing costs of avionics systems during acquisition and their lifetime operation is a matter of grave concern to the NATO family of nations. The NATO Governments need greater visibility and control over the life-cycle costs of any weapon or avionic system.

Fortunately, there have been formulated disciplined methods of providing such visibility and control over life-cycle costs; that is, over the development, acquisition, training, operating and support and, finally, disposal costs.

The Avionics Panel are sponsors of this Lecture Series which presents the basic principles of Avionics Systems Cost Analysis in a rapidly changing technology environment and gives proven methods of achieving significant cost savings.

The Lecture Series will cover the following subjects:

1. **Life-cycle costing (LCC)**
 - a. Cost estimating methods,
 - b. Procurement techniques,
 - c. Source selection methods.
2. **Design to cost (DTC)**
DTC is a management concept with unit cost objectives.
3. **Technology Environment**
Technology changes affect the cost and effectiveness of avionics systems.
4. **Costing of Software**
Discussion of costs and methods for reducing them.
5. **Modelling**
Mission Completion Success Probability Model (MCSP) and Design System Performance Cost (DSPC) model and other models incorporating reliability factors would be discussed.
6. **Applications**
This final session deals with the applications of the principles of LCC and DTC and the cost savings achieved.

Lecture Series Director: Dr I.G.Gabelman, Technical Associates Rome (NY), USA

Lecture Series No.101
(GCP)

**GUIDANCE AND CONTROL FOR TACTICAL
GUIDED WEAPONS WITH EMPHASIS ON
SIMULATION AND TESTING**

June 1979
Italy/Turkey/US

With the advent of modern Control Theory, a strong research effort has to be undertaken to investigate its impact on tactical guided weapons. To effectively accomplish this objective, it will be extremely beneficial to summarize the state-of-the-art of guidance and control for tactical weapons.

The tentative outline is as follows:

1. Introduction
2. Weapon Delivery (targeting, acquisition and weapon delivery aspects).
3. Missile Dynamics and Control Techniques (modern control application, higher order guidance, bank-to-turn control).
4. Missile Guidance Techniques (midcourse and terminal, guidance sensors, processing).
5. Guided Weapon Simulation Techniques (digital, hardware-in-the-loop: development, validation).
6. Testing of Missile Guidance and Control Systems (new range techniques, interface with simulation).
7. Summary – Future Trends.

Lecture Series Director: Mr C.T.Maney, Director, Plans and Research, USAF Armament Laboratory, Eglin Air Force Base, Florida 32542, USA

Lecture Series No.102
(SMP)

BONDED JOINTS AND PREPARATION FOR BONDING

April 1979
Netherlands/Norway

After more than 30 years of application in aircraft construction in roles with various degrees of structural importance, adhesive bonded joints are expected to see an increased use in more primary structural applications, both in conjunctions with metals as well as with advanced composites.

Basis for such advanced applications of bonded joints, however, must be ample knowledge on:

- structural design aspects,
- durability aspects

of bonded joints in order to provide the required static and dynamic strength of the bonded structure during its operational life time. With these demands in mind lectures are planned under the following headings:

1. Operational experience with adhesive bonded joints in military and civil aircraft.
2. The adhesive bonded joints as a fastening element in structures.
3. Fracture mechanical aspects of adhesive bonded joints and structures.
4. Materials and processes for adhesive bonded joint with optimum durability.
5. Special quality assurance aspects of adhesive bonded processes.
6. Non-destructive end-product inspection methods.

Lecture Series Director: Mr R.J.Schliekelmann, Fokker – WFWBV, Technological Centre, Schiphol, The Netherlands

Lecture Series No.103 (PEP)	NON-DESTRUCTIVE INSPECTION METHODS FOR PROPULSION SYSTEMS AND COMPONENTS	April 1979 UK/Italy
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The safety of use of mechanical systems is dependent on the identification of possible defects in their components. This applies particularly to turbine engines, certain elements of which – in particular, turbine and compressor discs and blades – are subjected to extremely severe stresses: creep, low cycle fatigue, thermal fatigue.

These possible defects must be detected when the various parts are at the manufacturing stage, on the one hand, and, on the other, during periodic inspections when the engine is in service.

It is therefore indispensable to have available non-destructive inspection methods which, while they are accurate and sensitive, can be used in workshops for the detection of defects or cracks, however small they may be.

A considerable amount of research work has been conducted in this field on the world scale and has led to the development of various methods: ultra-sonics, magnetic inspection, X-rays pictures. New procedures, which are complementary to these already conventional methods, are in the process of development or optimization: acoustical emission, laser holography, Eddy currents, etc...

The aim of this Lecture Series is to survey the means currently available, with particular emphasis on the intrinsic possibilities and present limits of use of the non-destructive inspection methods the most widely applied to turbine engines, and to define the state-of-the-art of the most advanced methods.

Lecture Series Director: Ingénieur en Chef G.Bessonnat, Direction des Recherches, Etudes et Techniques, Paris, France

Lecture Series No.104 (FMP)	PARAMETER IDENTIFICATION	October 1979 US/Netherlands
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The technique of Parameter Identification has been under development in a number of countries in recent years and, specifically, its application to the problems of analysis of flight test data has been examined by all the major NATO nations. As the last AGARD/FMP meeting on this subject was held in 1974, it was considered appropriate to bring together a number of experts in this field with a view to updating the information available and, in doing so, present it in the form of applications data and user experience so that it would be of practical value to the flight test engineer.

The lectures would examine basic theory and a number of applications of that theory to various areas of flight test work. The subjects covered would be such things as coefficient estimation including stability and control derivatives, performance and high angle-of-attack parameters, structural mode identification and turbulence, types of manoeuvre required; the purpose of parameters including vehicle compliance with specifications, definition of characteristics for simulation or refinement of configuration, and research to aid future design.

Lecture Series Director: Dr-Ing. P.Hamel, D.F.V.L.R., Braunschweig, Germany

Lecture Series No.105 (AMP)	INTENSIVE AIR OPERATIONS – PROBLEMS OF SLEEP, WAKEFULNESS AND CIRCADIAN RHYTHM	October 1979 France/Canada
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The Lecture Series is intended for those concerned with the management of civil, and particularly military, personnel who have to cope with irregular work and rest. It will provide an understanding of the physiological processes involved in the adaptation of man to disturbed sleep and wakefulness, and consider approaches to the problem of management including the use of drugs.

The lectures will be given in three parts:

1. Sleep, Wakefulness and Circadian Rhythms. Physiological and Psychological.
2. Adaptation of Man to Disturbed Sleep and Circadian Rhythmicity.
3. Management of Irregular Rest and Activity.

In the first part, attention will be given to the physiological basis of sleep, wakefulness and circadian rhythms and the psychological correlates including performance relevant to personnel involved in skilled activity. The second part will review studies on the adaptation of man to unusual patterns of rest and activity with special reference to present day situations, and the third part will attempt to provide a basis for the management of disturbed rest and the rationality for the use of drugs.

The series is designed for a wide range of interests in both the civil and, particularly, the military context, and for the land, sea and air environments. A particular feature will be the opportunity for participants with special interest in the management of such problems to take part in discussions with the lecturers. It is intended that the participants will include managers and operation staff as well as medical officers.

Lecture Series Director: Wing Commander A.N.Nicholson, Royal Air Force Institute of Aviation Medicine, Farnborough, Hampshire, UK

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Missile Aerodynamics (FDP) Lecture Series No.98	February/March 1979
Aerospace Propagation Media Modelling and Prediction Schemes for Modern Communications Navigation and Surveillance Systems (EPP) Lecture Series No.99	June 1979
Methodology for Control of Life-Cycle Costs for Avionics Systems (AVP) Lecture Series No.100	May 1979
Guidance and Control for Tactical Guided Weapons with Emphasis on Simulation and Testing (GCP) Lecture Series No.101	June 1979
Bonded Joints and Preparation for Bonding (SMP) Lecture Series No.102	April 1979
Non-Destructive Inspection Methods for Propulsion Systems and Components (PEP) Lecture Series No.103	April 1979
Parameter Identification (FMP) Lecture Series No.104	October 1979
Intensive Air Operations – Problems of Sleep, Wakefulness and Circadian Rhythms (AMP) Lecture Series No.105	October 1979

MILITARY COMMITTEE STUDIES

AEROSPACE APPLICATIONS STUDIES COMMITTEE

Chairman: Mr J-C.WANNER, France

PROJECT 2000 REVIEW BOARD

Chairman: Mr J.SCOTT-WILSON, UK

MILITARY COMMITTEE STUDIES DIVISION

<i>Chief:</i>	Colonel E.N.KEMLER, USAF
<i>Deputy for Systems Analysis:</i>	Colonel G.BRON, FAF
<i>Deputy for Research and Development:</i>	Mr J.WILD
<i>Deputy for Project 2000:</i>	Colonel J. de CHAMPEAUX de la BOULAYE, FAF

PROGRAMME

In response to a request from the NATO Military Committee, the Military Committee Studies Division is engaged in an effort to perform an 'Evaluation of Prospective Major Technological Developments in Aerospace up to the year 2000 and their Impact on Possible Military Applications' (short title 'Project 2000'). Phase two of this study was approved at the National Delegates Board meeting in September 1977 and is scheduled for completion by the end of CY 1979. The overall technical guidance and review of this effort will be provided by the Project 2000 Review Board which will meet twice during 1979. Reports of the three Working Groups, Attacks of Surface Targets, Defence Against Missile, and Ground Target Detection, Location Against Missiles, and Ground Target Detection, Location, and Recognition will be published in 1979 as well as an overall Project 2000 Executive Report.

By direction of the AGARD National Delegates Board, no new Aerospace Application Studies have been started during the course of Project 2000. With National Delegates Board approval, the next AAS could start as early as July 1979 if Project 2000 holds to schedule. To prepare for the restart of these studies, meetings of the Aerospace Applications Study Committee will be held during 1979 to write final Terms of Reference for AAS Nos.12 and 13 and to draft preliminary Terms of Reference for study topics being considered for AAS Nos.14 and 15.

Technology Studies are conducted in support of the North Atlantic Military Committee by Ad Hoc Study Groups sponsored by the appropriate Panels. The information and schedules on these studies are included in the Panel programmes.

MEETINGS

Project 2000 Review Board – Final Briefing by Working Groups (Classified)		21–23 May 1979 United States
AASC Meeting No.15 (Classified)	– Define Terms of Reference – AAS Nos.12 and 13 – Organize Working Group No.12	24–25 May 1979 United States
Project 2000 Review Board – Final Review of P-2000 Reports (Classified)		13–14 November 1979 Germany
AASC Meeting No.16 (Classified)	– Define Terms of Reference – AAS Nos.14 and 15 – Organize Working Group No.13	15–16 November 1979 Germany

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
Project 2000	
Executive Report	late 1979
Study 1 - Attack of Surface Targets	late 1979
Study 2 - Defence against Missiles	late 1979
Study 3 - Detection, Location and Recognition of Ground Targets	late 1979

HEADQUARTERS

OFFICE OF THE DIRECTOR

MEETINGS

46th NATIONAL DELEGATES BOARD MEETING	21-23 March 1979
26th STEERING COMMITTEE MEETING	Paris, France
26th PANEL CHAIRMEN MEETING	
9th NATIONAL COORDINATORS MEETING	
15th AGARD ANNUAL MEETING	19-21 September 1979
47th NATIONAL DELEGATES BOARD MEETING	Florence, Italy
27th PANEL CHAIRMEN MEETING	

PUBLICATIONS

<i>Subject</i>	<i>Projected Publication Date</i>
National Delegates Board Meeting	
Preprints	March 1979
Bulletin 79/2	July 1979
Director's Annual Report to North Atlantic Military Committee 1978	March 1979
1979 Annual Meeting Report	December 1979
AGARD Highlights 79/2	Fall 1979
80/1	Spring 1980
Calendar of International Aerospace/Aeronautical Meetings	Not yet decided

III – BUDGET SUMMARY

1979 TECHNICAL PROGRAMME

(IN FRENCH FRANCS)

Panels	1977 Commitments	1978 MBC Approved	1979 Proposed
AMP	137.000	251.000	249.000
AVP	126.000	199.000	177.000
EPP	161.000	126.000	139.000
FMP	158.000	240.000	181.000
FDP	287.000	272.000	245.000
GCP	180.000	164.000	230.000
PEP	309.000	209.000	263.000
SMP	341.000	300.000	323.000
TIP	110.000	73.000	75.000
SUB-TOTAL – PANELS	<u>1.809.000</u>	<u>1.834.000</u>	<u>1.882.000</u>
INDIVIDUAL CONSULTANTS	427.000	345.000	365.000
LECTURE SERIES	512.000	620.000	763.000
MILITARY COMMITTEE STUDIES	88.000	120.000	–
HEADQUARTERS	42.000	44.000	60.000
OTHER COSTS (Certificates, Layout Sheets, Forms, Meeting Announcements, Distribution, Internal Reproduction, Technical Translation, etc.)	288.000	270.000	290.000
TOTAL – NORMAL AGARD TECHNICAL PROGRAMME	<u>3.166.000</u>	<u>3.233.000⁽¹⁾</u>	<u>3.360.000⁽¹⁾</u>
MAD	139.000	–	119.400
P-2000 – PHASE I	27.000	–	–
P-2000 – PHASE II	–	190.000	488.000
TOTAL – SPECIAL TASKS	<u>166.000</u>	<u>190.000</u>	<u>607.400</u>
GRAND TOTAL – INCLUDING SPECIAL TASKS	<u>3.332.000</u>	<u>3.423.000⁽¹⁾</u>	<u>3.967.400⁽¹⁾</u>

(1) Average price for the full year

IV - 1979 PUBLICATIONS SUMMARY

<i>Activity</i>	<i>Reports</i>	<i>Advisory Reports</i>	<i>AGARDograph</i>	<i>Conference Preprints</i>	<i>Conference Proceedings</i>	<i>Misc.</i>	<i>Total</i>
AMP	—	—	2	2	2	1	7
AVP	—	—	1	2	2	—	5
EPP	—	—	—	2	2	—	4
FMP	—	4	1	—	2	—	7
FDP	—	2	1	2	3	1	9
GCP	—	2	1	—	2	—	5
PEP	—	4	—	3	3	—	10
SMP	4	1	1	—	3	—	9
TIP	—	—	1	1	1	2	5
DPP	—	—	—	—	—	8	8
MCS	—	—	—	—	—	4	4
HQS	—	—	—	—	—	6	6
TOTALS	4	13	8	12	20	22	79

GRAND TOTAL: 79

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